

Clinical profile of patients presenting with urolithiasis to the emergency department of a tertiary care teaching hospital

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Abstract

Urolithiasis is one of the most encountered diagnoses of the patients presenting with acute abdominal pain to the emergency department (ED). There is a worldwide increase in the prevalence of the disease. The risk factors include dehydration, high animal protein intake, decreased water consumption, high fatty diet, diabetes, hypertension, genetic and family history. The study was done to know the burden of urolithiasis cases presenting to ED in an urban industrial area in western Maharashtra, India. Clinical profile, complications, treatment and outcomes of urolithiasis were studied and outcome was measured as whether the patients were directly discharged from the ED or admitted for further management.

Keywords: Urolithiasis, renal stone, kidney stone, diet, emergency medicine, hydronephrosis, pain score, Stone score, Diclofenac, risk factors.

Introduction

Urolithiasis is a global problem affecting all geographical regions with a prevalence ranging from 7 to 13% in North America, 5-9% in Europe, and 1-5% in Asia. ^[1] The prevalence of kidney stones in the United States has risen from 5.2% to 8.8%. ^[2] ED visits in United States of America from 2006-2009 ranged from 5.8-8.4% with an average of 12% of hospitalization. ^[3] In India 12% of the total population are prone to Urolithiasis. ^[4] The stone belt occupies the areas of Maharashtra, Gujarat, Rajasthan, Punjab, Haryana, Delhi, Madhya Pradesh, Bihar, and West Bengal. The prevalence is 15% in North India compared to South India. ^[5] In a study done in Manipur 11.6% of all general surgery cases were of renal stones. ^[6]

Abundance of promoters and inadequacy of inhibitors mainly promote production and retention of crystals in renal tubules. Renal calculi are crystalline structures

composed most commonly of calcium oxalate salts. [7] Risk factors for super-saturation include dehydration, high fat diet, animal protein, high salt intake, obesity, family history, diabetes and hypertension.

There is a lack of literature and paucity of data on clinical profile and management of urolithiasis in ED from developing countries like India. The study was done to know the burden of urolithiasis cases presenting to ED in an urban industrial area in western Maharashtra, India. We included 100 patients presenting to the ED who were diagnosed with urolithiasis and collected their clinical and demographic data.

Material and methods

Institutional ethics committee approval was taken before the beginning of the study. A self-funded prospective observational study of 100 patients presenting to the ED of a tertiary care hospital during May 2019 to October 2020 was done. Considering a prevalence rate of 71 per 100 with acceptable difference of 9 per 100 with CI of 95% a sample size of 98 was calculated. It was approximated to 100. Due consent was taken from the patients before enrolling them in the study. The patients were admitted for at-least 24 hours and measurements of blood and urine parameters and USG by radiologist were done. All patients above 18 years with a clinical and radiological diagnosis of urolithiasis were included and patients with known history of chronic renal disease, trauma and current pregnancy were excluded

Results

We included 100 patients with the diagnosis of urolithiasis on ultrasound imaging. Outcomes were measured in the form whether the patient was transferred to urology or directly discharged home.

The age group of cases ranged from 18-75 years. The mean age was 36.98 years. Majority of the cases were in

the age group of 20-30 years. The cases in the younger age group were discharged more frequently compared to cases in older age groups. 66% were male and 34% were females. The male to female ratio was 1.9:1. Flank pain, the most common symptom was found in 67% of the cases. Other symptoms like nausea and vomiting was present in 22% of the cases, 7% of the cases had decreased urine output and 4% cases had burning micturition. (Figure-1), (Table 1)

34% of the patients were previously diagnosed with urolithiasis. The systolic blood pressure ranged from 160 to 100 mm of Hg. The mean systolic blood pressure was found to be 123 mm of Hg. The base line pain score range was 3 to 8 with a mean base line score of 5.67. (Table 1)

69 % of patients were found to follow a mixed diet. 7% of the patients were diabetic, 25 % of the patients were hypertensives, 60 % of the patients were found to have less than 2 litres of daily water consumption and 59% of the patients either smoked and/or were habitual to alcohol consumption.

16% of cases had abnormal renal function tests. 33% of the patients had urinary tract infection and hematuria. On ultrasonography, 49% of the patients had left side stones, 48% on the right side while 3% had bilateral stones. 54% of them had ureteric stones, 33 had renal stones and 13 cases had both renal and ureteric stones. (Figure 2)

In 48% of the cases, only diclofenac was used to relieve pain. A combination of diclofenac and tramadol was used to alleviate pain in 52% patients. 24% cases had complication in the form of hydroureteronephrosis (HUN). (Figure 3)

Discussion

The incidence of renal colic is higher in countries like Saudi Arabia, Europe, Mediterranean countries and

Australia. The incidence in India has regional variation with higher incidence found among the people of Northern India. Various states like Punjab, Haryana, Rajasthan, Gujarat, Delhi and Maharashtra include the major stone forming belt. [3, 6, 9] Age, gender, family history, diabetes, hypertension, socioeconomic status and climate are the various risk factors [7]. Ultrasonography and X-ray KUB are the investigations which are done in ED to know the site, size and type of renal stone.

In the present study, age group of cases ranged from 18-75 years. The peak incidence was found between 20-30 years. The mean age was found to be 36.98 years. It was also found that age had no significant association with the outcome in the study. These results were in concordance with various studies conducted in India, Asia and western countries. [4, 10, 11, 12, 13, 14]

66% were males and the male: female ratio was found to be 1.9:1. A similar study conducted in southern part of India and South Asia showed similar findings. [4, 10] The increased male predominance may be due to larger muscle mass in males, more physical work with dehydration. [15] In the present study it was found that gender has no association with the outcome.

The most common symptom was found to be flank pain (67%) followed by nausea and vomiting (22%), 7% had decreased urine output and 4% had burning micturition which were like the other studies [10, 11]

69% of the patients consumed mixed diet, high consumption of animal protein increases the formation of stones. Similar findings were found in a study conducted at Assam. [16] 7% were diabetics and the rest were non-diabetics. In another study it was observed that 11% were diabetics. [17] Type 2 DM is associated with insulin resistance, which results in a deficit in ammonia production and lowers the pH, favoring formation of

stones. 60% of the patients had inadequate water consumption (< 2-3liters) per day and 59 % of the patients either smoked or consumed alcohol. Similar observations were found in a study conducted from South India and North-eastern part of India. [4, 18]

34% of cases were diagnosed with urolithiasis in the past. Studies conducted in Taiwan found that 32.2% of the cases had previous history of urinary stones. [12] A study had found that lifetime recurrence rate was around 50% within 10 years of initial episode. [10]

On examination, mean systolic blood pressure was found to be 123 mm of Hg, the minimum systolic blood pressure was recorded as 100 mm of Hg and maximum systolic blood pressure was 160 mm of Hg. It is also seen in a study conducted by Borghi L et al that; hypertensive patients have a high risk of development of renal stones because of higher oxaluria, calciuria as well as supersaturation of calcium oxalate and uric acid in urine. [19]

The minimum baseline pain score was 3 and the maximum baseline score was 8 with mean baseline pain score of 5.67. The pain of renal colic reaches its maximum threshold within 1-2 hours of onset of pain. The patient usually arrives in ED when the pain has reached at its maximum intensity afterwards pain remains constant and subsides after some time. It was found that there was significant association between baseline pain score level and the outcome in our study. The cases with higher baseline pain score were more frequently transferred to the urology, whereas cases, with low baseline pain were more frequently discharged with medications. The data from the present study was in concordance with various studies conducted worldwide.

[20] The mean score was found to be 5.67 ± 1.8 which was like the mean baseline score found in the present study.

[12] (Figure 3)

33% of the cases had hematuria; the renal function tests were abnormal in 16% of cases. [15] These cases were more frequently transferred to the urology department, implying that abnormal investigations are significantly associated with outcome. On ultrasonography, 48% had right sided, 49% had left sided and bilateral stone was found in 3%; these findings were similar to a study done in North-eastern India [21]

In the present study, it was found that 54% cases had ureteric stones, 33% had renal stones and 13% had both. In a study conducted by Chand et al in Nepal it was found that 47% of the cases had ureteric stones [22]

The number of pain medication had notable association with the outcome, suggesting that cases in which single medication was given were discharged more commonly than cases in which combination of medications were given, were more commonly transferred to urology. These results were in concordance with the results of Cochrane review which concluded that both NSAIDs and opioids can significantly relieve the pain in renal colic. [23, 15]

HUN has a consequential association with the outcome. The cases with HUN were often transferred to urology. A study done in Nepal suggested that the size of the stone had significant associated with HUN. [15]

The outcome in present study was measured in form of cases which were transferred to urology and cases which were discharged. 73% of the cases were discharged which is a finding in concordance with a study done in US. [3]

Hence, this study highlights the clinical presentation and management modalities of cases of renal colic presenting to ED, since the data regarding it is relatively scarce. This study demonstrates that the outcome in urolithiasis

is significantly associated with various clinical parameters.

Figure 1: Age and gender distribution.

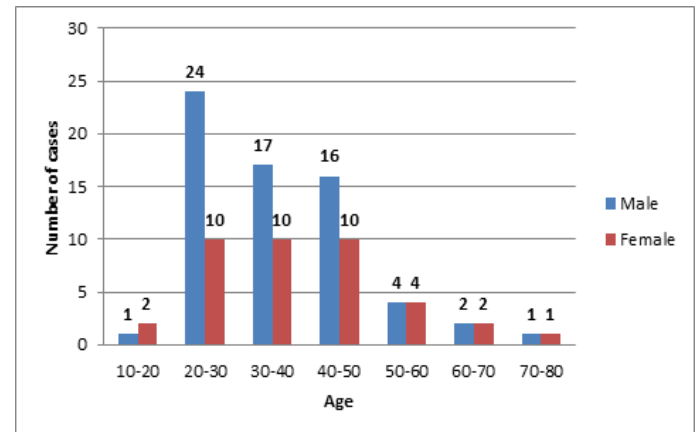


Figure 2: Risk factors and investigations.

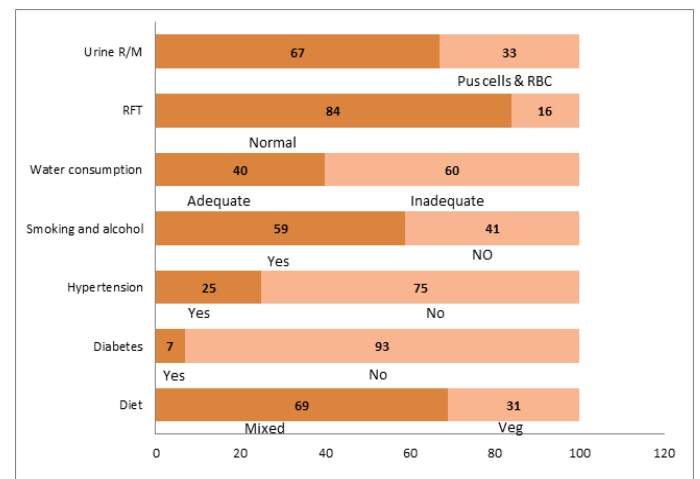


Figure 3: Various parameters with the outcome.

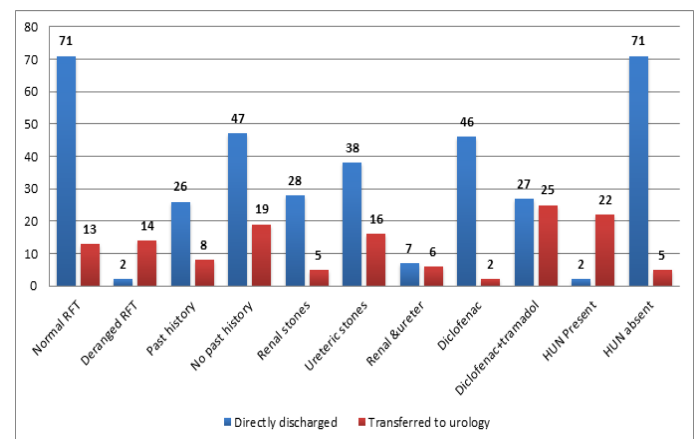


Table 1

Factors	Number of patients (%)	Past history of urolithiasis	Numbers of patients (%)
Gender distribution		Present	34
Male	66	Absent	66
Female	34	Systolic blood pressure	
Symptoms		Maximum BP	160
Flank Pain	67	Minimum BP	100
Nausea and vomiting	22	Mean BP	123
Burning micturation	4	SD	14.8
Decreased urine output	7	Laterality of the stones	
Base line pain score		Left	49
Minimum pain score	3	Right	48
Maximum pain score	8	Bilateral	3
Mean pain score	5.6	Directly discharged	73
SD	1.1	Transferred to urology	27
Site of stone			
Renal	33		
Ureter	54		
Both	13		

Demographic factors, symptoms, pain score, site of stones, past history and disposition

SD-Standard deviation

BP-Blood pressure

Conclusion

Patients present to ED with complaint of abdominal pain and some of them even have excruciating pain, but once adequate pain relief is achieved, they prefer to take out-patient treatment. Factors such as age, gender, past history, site of the stone and STONE score showed no correlation with patients requiring further urological management. Whereas factors such as baseline pain score, deranged RFT's, number of medications used for pain relief, HUN and size of the stone has significant correlation with extended admissions and requirement of further management. Hence if a patient presents with these features an ED physician should explain regarding the possibility of the same to the patients as it may mean increased mental and financial burden on the patient. Patients with a stone size of >10 mm (regardless of the location) should alarm the physician of a possibility of urological intervention and the same may be conveyed to the patient.

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